SEPTIC TEETH.*

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The object of your essayist in presenting this subject is to place before you certain facts in relation to the pathology of these teeth, and a few practical suggestions as to their treatment, gained from clinical experience.

I am not presuming to pose as your teacher, but only desire to add my mite to the elucidation of this interesting and important subject. There will be no attempt upon my part to enter into the operative technic usually employed by the dental surgeon in the treatment of this class of teeth, for it would not only be tedious to you, but unprofitable.

Furthermore, there is a time limit set by your rules which must not be over-stepped; consequently, much of the detail which might, under other circumstances, be proper to present, must be left out.

Several interesting cases might also be presented, but I presume they would only duplicate others which have occurred in your own practice, and may therefore, for the same reason, be omitted.

Septic teeth may be divided into four classes:

(a) Teeth which have lost their pulp vitality and contain gangrenous pulps.

(b) Teeth which, by reason of containing devitalized pulps, in whole or in part, are producing chronic periapical irritation.

(c) Teeth which are devitalized and, by reason of their septic condition, are causing dento-alveolar-abscess, acute or chronic.

(d) Teeth which have been treated by removal of the pulp and filling of the root canal, but in which the dentinal tubuli and fibrillæ have not been thoroughly sterilized.

We purposely refrain from including in this classification those teeth which are affected with so-called pyorrhea alveolaris for, although their alveoli are in a septic condition, the teeth are usually vital, and, consequently, not septic.

Before entering upon the consideration of our subject, let us for a moment glance at the anatomy of a normal tooth, and its relation to the jaws.

A tooth is composed of enamel, dentine, cementum, a central pulp, and a membrane covering the root; and the tooth is set in a socket, or alveolus.

The superior anterior teeth, at their apices, are in close relation to the floor of the nasal fossa. The bi-cuspids and molars bear a similar relation to the floor of the antrum, and not infrequently penetrate it, while the inferior bi-cuspids and molars at their apices often lie in close proximity to the inferior dental canal, and sometimes penetrate into it; as was shown about a year ago by Dr. Josef Novitzsky, of this city.

The dentine is traversed by numerous little tubes, which contain delicate nerve fibrillæ, while the cementum contains numerous lacunæ, and these are connected with each other by delicate processes. The tubuli and fibrillæ of the dentine make up about 28% of the mass of this tissue. In other words, the dentine is composed of 72% of inorganic matter, and 28% of organic matter. Bone is composed of 66.50% of inorganic matter, and 33.50% of organic matter.

The central pulp is the organ of nutrition and sensation for the dentine and enamel, while the peri-cementum performs the same office for the cementum, and gives attachment of the tooth to the alveolus of the jaw. In other words, in this respect it is an articular membrane forming the dento-maxillary joint.

Sepsis produced by devitalized teeth and necrosed bone is generally considered as being one of the most virulent of all forms of sepsis having their origin in the tissues of the living body. With these statements before us, let us now turn to the consideration of the various classes of septic teeth.

(a) Teeth which have lost their pulp vitality and contain gangrenous pulps.

This is a very common condition in the mouth of individuals who are afflicted with rapid decay of the teeth. When dental caries reaches the central pulp, it exposes this organ to various forms of irritation, especially to the pyogenic micro-organisms. These irritants produce congestion and inflammation, which soon results in the death of the pulp, a gangrenous condition. The saphrophitic micro-organisms then attack it; liquefaction of the tissues takes place, and the material is usually discharged into the mouth through the cavity of decay and is swallowed. When the material is not discharged into the mouth, the condition designated as class (b) is usually developed.

The predominant micro-organism present in a gangrenous pulp is the B. pulpæ gangrenosæ of Arkovy, an exceedingly virulent organism, as you would soon realize should you be so unfortunate as to wound a finger with an instrument that had been in recent contact with such a pulp.

Prof. W. J. Gies and his collaborator, I. J. Klinger, have recently reported—December, 1915, in the *Journal of the Allied Dental Societies,* Vol. X, p. 454, having found the same, or similar organism in gangrenous dental pulps. They say:

"In decay of the pulp . . . . the cocci remain low in proportion; the thread forms almost disappear. The non-spore-forming rods continue to be quite as numerous as they were in the primary stages of caries, but a new form—an anerobic, putrifactive, spore-bearing rod—was found in large numbers." This organism they designate *B. putrificans.*

The virulence of this organism and its frequent presence in devitalized teeth has raised this question in the mind of your essayist, and is now presented to you for your consideration. May not this gangrenous condition of one or more dental pulps discharging into the mouth of an individual and constantly swallowed be one of the causes of ulcer of the stomach, induced by infection through some slight trauma of its mucosa? It has been my observation that individuals who are suffering from ulcer of the stomach usually have neglected mouths and many badly decayed teeth. Your essayist is, therefore, inclined to the opinion that

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gangrenous pulps, by reason of the great virulence of the organisms found in this disease, may approach the condition of a specific cause of ulcers of the stomach. Of course, the question of proof, absolute proof of this assumption, would require team work in research upon the part of the bacteriologist, the internist, the surgeon and the oral specialist. This, we have not yet had the opportunity to carry out.

A very large majority of the micro-organisms that enter the stomach are destroyed by the action of the gastric secretions. Certain pathogenic organisms, however, are very resistant to the action of these secretions; for instance, the bacillus tuberculosis, the bacillus coli communis, the bacillus typhosus, the spirillum of Asiatic cholera and others. This is probably due to the fact that they possess a very resistant external covering or envelope which is not affected by the gastric secretions. The bacillus pulpæ gangrenosa is evidently a saprophite, as it is only found in the dental pulp when this organ is in a decomposing or putrefying condition.

Treatment of Class A Teeth. The usual treatment for a tooth in this condition is the extirpation of the gangrenous pulp, sterilization of the pulp-canal and the dentinal tubuli and their contents and, later, hermetically sealing the canal and the cavity of decay with a suitable filling material. This would render such a tooth entirely innocuous. This is not, however, always possible for various reasons; viz., the small size of the canal, occlusion of the canal at some portion of its length, or abrupt curves or angles in the form of the root.

Teeth, the canals of which cannot be opened to their root-apex (and the X-ray picture will indicate that), should be extracted, as all attempts to place such teeth in a healthy condition will be fruitless.

No up-to-date dental surgeon or oral specialist will to-day neglect to employ the X-ray as a means of diagnosis in these cases.

(b) Teeth which, by reason of containing devitalized pulps, in whole or in part, are producing chronic peri-apical irritation.

Peri-apical irritation in these cases is due to septic micro-organisms which have passed from the pulp-canal into the peri-apical tissues. The irritation may be mild or severe in character, depending upon the number and the virulence of the organisms present, upon the one hand, and upon the vital resistance of the tissues and the phagocytic activity of the white blood-cells upon the other.

In the milder cases the irritation assumes a chronic type, which usually results in certain changes in the surrounding bone structure known as rarefying osteitis, or osteo-porosis, or in the formation of a mass of fungus granulation tissue—an infectious granulation tumor; or of a blind abscess, surrounded by a more or less extensive area of bone resorption; while in other cases it may produce hypertrophy of the external alveolar plate overlying the infected area.

Upon the extraction of such teeth the granuloma, or the abscess sac, as the case may be, frequently comes away attached to the apex of the root. Teeth in this condition may go for months or years without causing any objective symptoms other than an occasional slight soreness following a cold, or of unusual stress applied in mastication, like biting upon a piece of bone, or a bird-shot.

This form of dental sepsis and that designated as (d) class are, by reason of their insidious character and chronic type, among the most dangerous to the general health.

These are the conditions that are so often found associated with articular rheumatism, arthitis deformans, neuresthenia, neuralgias, neuritis, certain forms of nephritis (septic), the "septic gastritis" of Hunter, myocarditis, endocarditis and pericarditis.

You are all familiar with the researches of Billings, Rosenow, Hartzel, and others along these lines, so I need not take up your time by quoting from their work. It seems, however, to be an established fact that dental sepsis is a condition that must not be overlooked when searching for a rational explanation of the causes of the diseases just mentioned.

In the severe type of irritation of class (b) the condition rapidly progresses to that of class (c) in which a dento-alveolar abscess is formed.

In the treatment of the chronic type of class (b) the first step is to secure a good X-ray picture. We say "good" because there are so many bad ones made; so bad that one may read into them almost any fallacy which, at the time, may obsess the mind. With this good picture the conditions of the case are as plain as an open book. The important question to be decided is—what shall be done with these teeth? Shall they be extracted? We answer not in every case. In fact, many of them can be successfully treated, *cured,* and rendered innocuous and serviceable for many years. There is, however, a growing tendency upon the part of many physicians to advise the extraction of all devitalized teeth. This, we believe, is a mistake, in view of the fact just stated. The conservative dentist will not attempt to treat one of these teeth if the X-ray picture reveals an apparently insurmountable obstacle in the form of the root and its canal; or in which there is a considerable involvement of the surrounding bone. Under such circumstances, the tooth should be extracted and, if the bone were involved, this area should be thoroughly curetted.

The teeth are valuable organs, and man is only endowed with two sets, consequently, the unnecessary loss of even one permanent tooth is a serious matter; but, on the other hand, the health of the individual is of more consequence, and of more value than many teeth. Wisdom and conservatism have no better place for their exhibition than in this connection.

(c). Teeth which are devitalized and, by reason of the septic condition of the root-canal, are causing a dento-alveolar abscess, acute or chronic.

Teeth of this class, when the abscess is of the acute type, are exceedingly dangerous to health and not infrequently end fatally from

acute septicaemia. When the abscess is of the chronic type it may give rise to a low grade of general sepsis, resulting in such diseases as those just mentioned under class (b).

The Bacillus pulpae pyogenes of Miller is generally thought to be the organism responsible for the establishment of acute dento-alveolar abscess. It is found in decomposing and gangrenous pulps and in putrescent root-canals. It is exceedingly virulent. White mice, when inoculated with it by injection into the peritoneal cavity, die in from 18 to 20 hours.

When a tooth is the seat of an acute dento-alveolar abscess, there is always a considerable involvement of the bony structure at the epex of the root, and, sooner or later, the abscess points through the external plate of the alveolar process, generally toward the lip or cheek, or it may seek an exit along the side of the root, discharging at the margin of the gum. Occasionally it points toward the tongue, this more often in the lower jaw than the upper for reasons that are patent. Sometimes the swelling is very great. When associated with the upper jaw it not infrequently closes the eye; and when located in the lower jaw, in the region of the molars, it may be so extensive as to make deglutition impossible, and greatly obstruct breathing. This condition is sometimes erroneously diagnosed as Ludwig's Angina.

A chronic dento-alveolar abscess is usually the sequel of an acute abscess which has established a fistula. These conditions, if untreated, may persist for months or years without causing any alarming objective symptoms. There is generally a constant discharge of pus into the mouth, and the predominant micro-organism present is usually the streptococcus viridans. This is the organism which, according to Billings, Rosenow, Hartzell and others, seems to be the chief factor in the production of so many of the diseases which we now know have a septic origin.

The treatment in the acute cases, if the temperature goes above 100° F. should be immediate evacuation of the pus, if it can be reached, or failing in this the extraction of the tooth. Acute septicaemia is to be feared if prompt removal of the focus of infection is not obtained.

(To be concluded in November, 1916.)

ROCKY MOUNTAIN SPOTTED FEVER—ITS PREVALENCE AND DISTRIBUTION IN MODOC AND LASSEN COUNTIES, CALIFORNIA—A PRELIMINARY REPORT.

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Acting under instructions from Dr. J. G. Cumming, director of the Bureau of Communicable Diseases, California State Board of Health, I made in May, 1916, an investigation in order to determine the prevalence and geographic distribution of Rocky Mountain spotted fever in Modoc and Lassen Counties. Although for several years the disease has been known to be present in the northern part of the state,[1 2 3 4] this was the first attempt made to definitely establish its existence and to study its distribution. The information was obtained from personal observations of cases, from interviews with physicians, and from replies to letters sent to each physician in Modoc and Lassen Counties. I wish to acknowledge with thanks the hearty co-operation received from the physicians in both counties, and to particularly thank Dr. W. E. Dozier, County Health Officer of Lassen County, through whose courtesy I was enabled to see four cases of this disease.

The first case seen was of a mild type. The patient, C. A., a former State Board of Health Inspector, contracted the disease in Secret Valley, ten or twelve miles west of the California-Nevada line. When seen by me, he had been ill for about ten days and gave a history typical of Rocky Mountain spotted fever. About a week after being bitten by ticks, the evidence of which was still present at the time of my inspection, he was taken with a severe headache, intense pain in the muscles and joints, particularly in the wrists, ankles and calves, a chill, a slight rise in temperature, and obstinate constipation. The muscle and joint pains grew worse, his temperature increased, and at times he became slightly delirious. On the third day, a macular roseolar eruption appeared over the forehead and upper thorax, followed in about twenty-four hours by the characteristic petechial eruption. When seen by me the rash consisted of a petechial eruption covering the whole body and involving the forehead, scalp, palms of the hands and soles of the feet. The hemorrhagic spots were for the most part discrete and had become confluent only in a few places. His temperature when seen was 101° and the maximum had been 103.6°. Dr. Dozier stated that this was a mild case and that commonly the temperature reached 105° and 106°. He said also that the eruption often became confluent with severe hemorrhages into the skin.

The second case was seen only in the prodromal period. The patient was a sheep herder who passed through Susanville on his way to Reno. When seen by Dr. Dozier and myself this man showed no signs of the disease excepting the evidence of tick bites and the beginning of a macular roseolar eruption over the forehead and chest. Unfortunately the patient could not be kept under observation so that a positive diagnosis was impossible. However, he had when seen, the usual prodromal symptoms of chilliness, headache, pains in his muscles, joints and bones, slight increase in pulse and respiration, slight rise in temperature, constipation, and general malaise. The infection was contracted in the Willow Creek District.

The next patient was B. F. H., another State Inspector, who was in the early stage of the disease. This patient, who also had contracted the disease in the Willow Creek district, had been ill for about a week. For several days he